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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/781,564	02/13/2001	Toshiaki Okuno	50212-191	2297

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EXAMINER

CHAN, ALEX H

ART UNIT PAPER NUMBER

2633

DATE MAILED: 11/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/781,564

Applicant(s)

OKUNO ET AL.

Examiner

Alex H Chan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 February 2001.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All   b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

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## DETAILED ACTION

### *Specification*

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: An optical amplifying transmission system yielding a lower noise figure at the first multiplexing stage than the second multiplexing stage.

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 1, 3-4, 6, 8, 9, 11, 13-14, and 16-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,563,733 to Mitsuda et al (hereinafter Mitsuda) in view of U.S. Patent No. 6,028,698 to Ogoshi et al (hereinafter Ogoshi).

**Regarding claim 17**, Mitsuda discloses an optical transmission method applied to an optical transmission system (Fig. 6) comprising an optical transmission line (34 of Fig. 6) through which a plurality of signal light components having wavelengths different from each other (Col. 1, lines 66-67 and Col. 2, line 1) included in a predetermined wavelength band are transmitted; a plurality of optical amplifiers (e.g. optical fiber amplifying sections, 31, 32, and 33 in combination with 11, 12 and 13 of Fig. 6 respectively and Col. 2, lines 35-37) installed on said optical transmission line, each having a wavelength-dependent noise figure (e.g. 0.98  $\mu\text{m}$  pump light of 11, 12 and 13 improves noise figure, Col. 13, lines 46-50); a first signal multiplexing

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section (21 of Fig. 6), installed upstream said plurality of optical amplifiers (e.g. upstream from 31, 32 and 33 of Fig. 6) in a signal light propagating direction (via 34 of Fig. 6), for multiplexing a first signal light component (53 and 51 of Fig. 6 and Col. 7, lines 36-38); a second signal multiplexing section (22 of Fig. 6) installed between said plurality of optical amplifiers (e.g. between 31 and 32 of Fig. 6), for multiplexing a second signal light component (55, 56, 57 or 52 of Fig. 6 and Col., 7, lines 38-60); and a receiving station (105 of Fig. 17), installed downstream said plurality of optical amplifiers (107 of Fig. 16 or 17), for receiving said first signal light component having a first signal wavelength multiplexed at said first signal multiplexing section and said second signal light component having a second signal wavelength multiplexed at said second signal multiplexing section (Col. 13, lines 17-50 and Col. 17, lines 38-40). Though Mitsuda discloses that the noise figure can be improved through exciting 0.98  $\mu\text{m}$  pump light at the input section of amplifier (Col. 7, lines 64- Col. 8, lines 1-4), he does not explicitly disclose that the first signal light component having said first signal wavelength whose noise figure between said first signal multiplexing section and said receiving station is lower than that of said second signal wavelength is selectively assigned as said signal light component multiplexed at said first signal multiplexing section. Ogoshi discloses first signal light component having said first signal wavelength (e.g. 15 of Fig. 1) whose noise figure between said first signal multiplexing section (14 or 16 of Fig. 5) and said receiving station (52 of Fig. 5) is lower (Col. 1, lines 45-49, Col. 2, lines 42-44 and Col. 4, lines 36-44) than that of said second signal wavelength (e.g. 20 of Fig. 1) is selectively assigned as said signal light component multiplexed at said first signal multiplexing section (e.g. by implementing a 980 nm excitation light source). Accordingly, one of the ordinary skill in the art would have been motivated to incorporate a first

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signal wavelength whose noise figure is lower than that of second signal wavelength because the overall noise figure of the optical fiber amplifier is dominated by the noise figure of the front stage and a low noise figure at the input is advantageous to help maintaining its output optical power (Col. 3, lines 43-48 and Col. 4, lines 36-43). Therefore, it would have been obvious to one artisan skill in the art at the time the invention was made to have modified optical fiber transmission system of Mitsuda by having a first signal wavelength at the first multiplexing section that has a lower noise figure than the second signal wavelength at the second multiplexing section because Ogoshi suggests that this is advantageous in maintaining the optical power output.

**Regarding claim 16**, the limitations introduced by claim 16 correspond to the limitations introduced by claim 17. The treatment of claim 17 above reads on the corresponding limitations of claim 16. There is also one additional limitation introduced by claim 16; that is, a plurality of signal multiplexing sections (e.g. 21 and 22 of Fig. 6, Mitsuda) installed on said optical transmission line connected to an input end side of said optical amplifier (e.g. 51 and 53 are coupled via 21 and 22 at input end for amplification and outputted to 32, Col. 5, lines 39-56, Mitsuda).

**Regarding claim 18**, the limitations introduced by claim 18 correspond to the limitations introduced by claim 17. The treatment of claim 17 above reads on the corresponding limitations of claim 18. There is also one additional limitation introduced by claim 18: that is, the second signal multiplexing section (22 of Fig. 6, Mitsuda) is installed upstream said plurality of optical amplifiers (e.g. upstream from 32 and 33 of Fig. 6, Mitsuda) but downstream said first signal

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multiplexing section (e.g. downstream from 21 of Fig. 6, Mitsuda), for multiplexing a second signal light component (55 and 56 of Fig. 6, Mitsuda).

**Regarding claim 1**, the limitations introduced by claim 1 correspond to the limitations introduced by claim 17. The treatment of claim 17 above reads on the corresponding limitations of claim 1.

**Regarding claim 11**, the limitations introduced by claim 11 correspond to the limitations introduced by claim 17. The treatment of claim 17 above reads on the corresponding limitations of claim 11. There are also two additional limitations claimed in claim 11; that is; a first multiplexing station (e.g. combination of 21 and 11 of Fig. 6, Mitsuda) and first signal light outputting means (21 outputting 55 of Fig. 6, Mitsuda), and a second multiplexing station (e.g. combination of 22 and 12 of Fig. 6, Mitsuda) and a second signal light outputting means (22 outputting 56 of Fig. 6, Mitsuda).

**Regarding claim 6**, the limitations introduced by claim 6 correspond to the limitations introduced by claims 17 and 11. The treatment of claims 17 and 11 above reads on the corresponding limitations of claim 6.

**Regarding claim 13**, Mitsuda in view of Ogoshi discloses a WDM coupler (21, 22, 23, or 24 of Fig. 6, Mitsuda).

**Regarding claim 14**, Mitsuda in view of Ogoshi discloses an Er-doped fiber amplifier (e.g. earth doped, Col. 5, lines 5-8).

**Regarding claims 3 and 8**, the limitations introduced by claims 3 and 8 correspond to the limitations introduced by claim 13. The treatment of claim 13 above reads on the corresponding limitations of claims 3 and 8.

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**Regarding claims 4 and 9**, the limitations introduced by claims 4 and 9 correspond to the limitations introduced by claim 14. The treatment of claim 14 above reads on the corresponding limitations of claims 4 and 9.

3. **Claims 2, 5, 7, 10, 12 and 15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mitsuda in view of Ogoshi as applied to claims 17 and 11 above, and further in view of U.S. Patent No. 6,404,525 B1 to Shimomura et al (hereinafter Shimomura).

**Regarding claim 12**, Mitsuda in view of Ogoshi does not explicitly disclose that the signal multiplexing section includes an optical ADM. Shimomura discloses a signal multiplexing section (Fig. 12 or 13) includes an optical OADM (Fig. 3-9) capable of switching wavelength-multiplexed optical signal (Col. 1, lines 9-12). Accordingly, one of ordinary skill in the art would have provided an optical OADM in order to reduce amount of hardware per transmission optical signal rate and to reduce the cost and system size (Col. 1, lines 43-45). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the optical transmission system of Mitsuda in view of Ogoshi to incorporate an optical ADM to obtain the invention as claimed in claim 12.

**Regarding claim 15**, Mitsuda in view of Ogoshi and Shimomura discloses signal wavelength indicating means (e.g. 213 of Fig. 25) for indicating a setting of said signal wavelength for said signal light outputting means in each of said plurality of multiplexing stations according to said noise figure (Col. 29, lines 49-67).

**Regarding claims 2 and 7**, the limitations introduced by claims 2 and 7 correspond to the limitations introduced by claim 12. The treatment of claim 12 above reads on the corresponding limitations of claims 2 and 7.

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**Regarding claims 5 and 10**, the limitations introduced by claims 5 and 10 correspond to the limitations introduced by claim 15. The treatment of claim 15 above reads on the corresponding limitations of claims 5 and 10.

#### *Conclusion*

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sugaya et al (Fig. 1), Aoki (Fig. 1), DiGiovanni et al (Fig. 1), Kosaka et al (Fig. 13 and 14), Inagaki et al (Fig. 6), Imoto et al (Fig. 5), Huber (Fig. 1), Mitsuda et al (Fig. 19 and 20), Fukushima et al (Fig. 2 and 7), Nakano (Fig. 5), Angellieri et al (Fig. 9 and 10), Grasso (Fig. 3 and 4), and Nakazato (Fig. 2A and 14, 17, 18) are cited to show related and similar work in optical transmission system comprising optical amplifiers, multiplexing stations, couplers and amplifying fibers. Shimomura et al (U.S. Patent No. 6,466,344 B2) (Fig. 14, 15 and 17) and Iwata et al (Fig. 6 and 7) are cited to show optical ADM. Alexander et al (Fig. 3), Sakamoto et al (Fig. 3 and 4) and Sugaya (Fig. 7) are cited to show related work in Noise Figure in an optical transmission system.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex H Chan whose telephone number is (703) 305-0340. The examiner can normally be reached on Monday to Friday (8am to 6pm EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (703) 305-4729. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

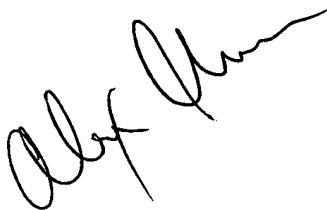
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

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October 24, 2003



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